# Enterprise Linux Workloads for Itanium-Based Servers

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# Agenda

- Linux in the Enterprise: A Brief History
- A Spectrum of Linux Workloads
- Scale Out and Scale Up—or Both?
- IDC Workloads Data
- HPC and Early Adoption of Linux on Itanium
- Enterprise Workloads for Linux on Itanium
- Database and Itanium
- IDC Server Market Data
- IDC Server Forecast

# A Brief History of Linux Servers

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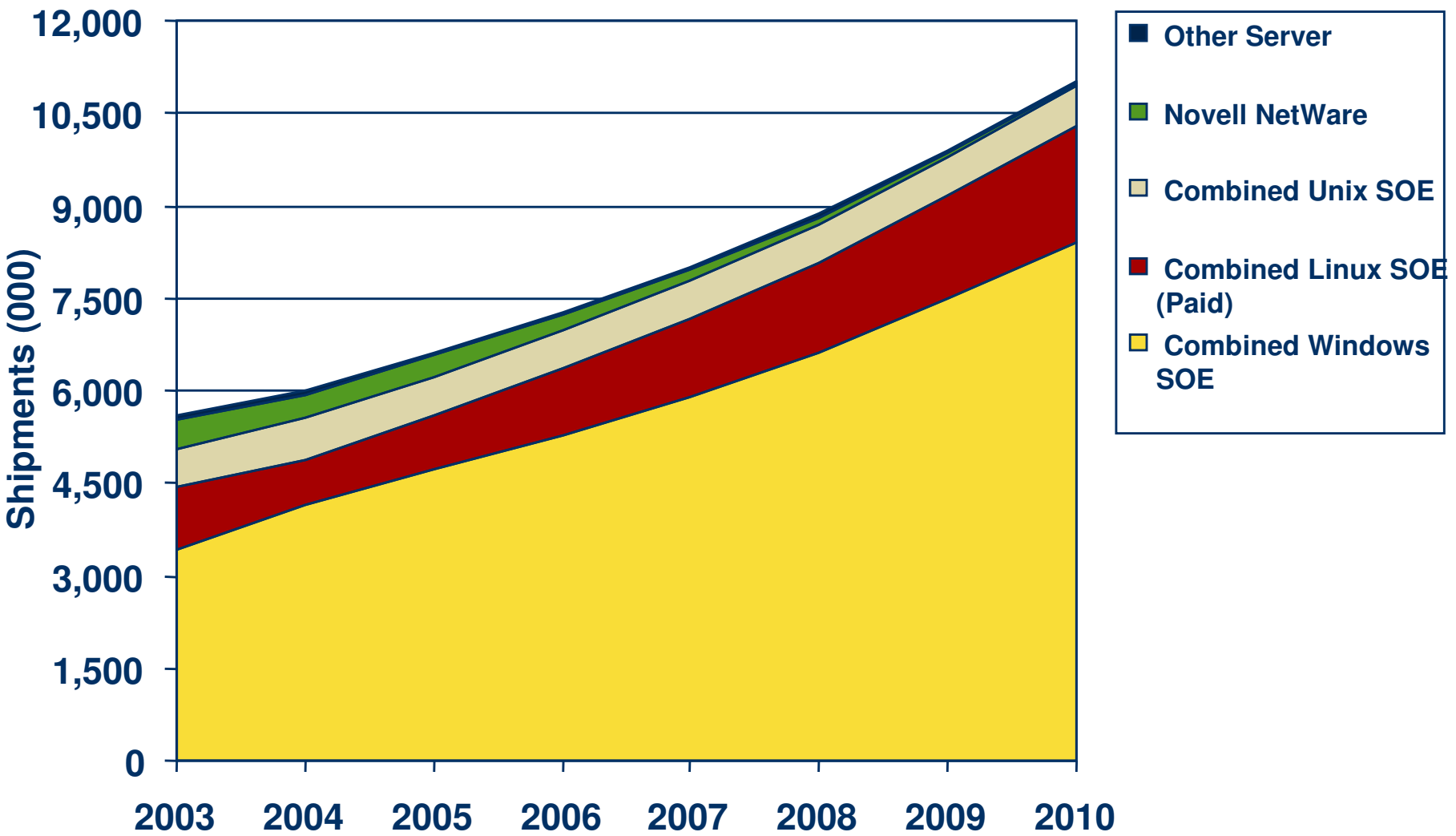
- Linux operating system debuts in 1991
- Becomes widely adopted in late 1990s
- Open source, and the Internet, fuel wave of adoption
- IDC data shows fast ramp since 2001-2003
- Volume servers spread Linux use for Web workloads
- Early adoption for HPC Linux clusters
- Linux enterprise ecosystem is growing, with ISV support

# Drivers to Use Linux Today

- Attractive hardware acquisition costs
- Availability of low-cost, open-source software
- Ability to modify Linux system software
- Linux runs across all hardware platforms
  - x86, x86-64, EPIC, RISC and CISC (including mainframes)
- Interest in alternatives to Windows and Unix, offering customers choice in software platforms
- Expectations of improved price/performance
- Re-use of existing Unix skills in enterprise, HPC computing

# Worldwide SOE New License Shipments






Source: IDC, 2007

# Linux Strengths Today — and Where It Needs to Go

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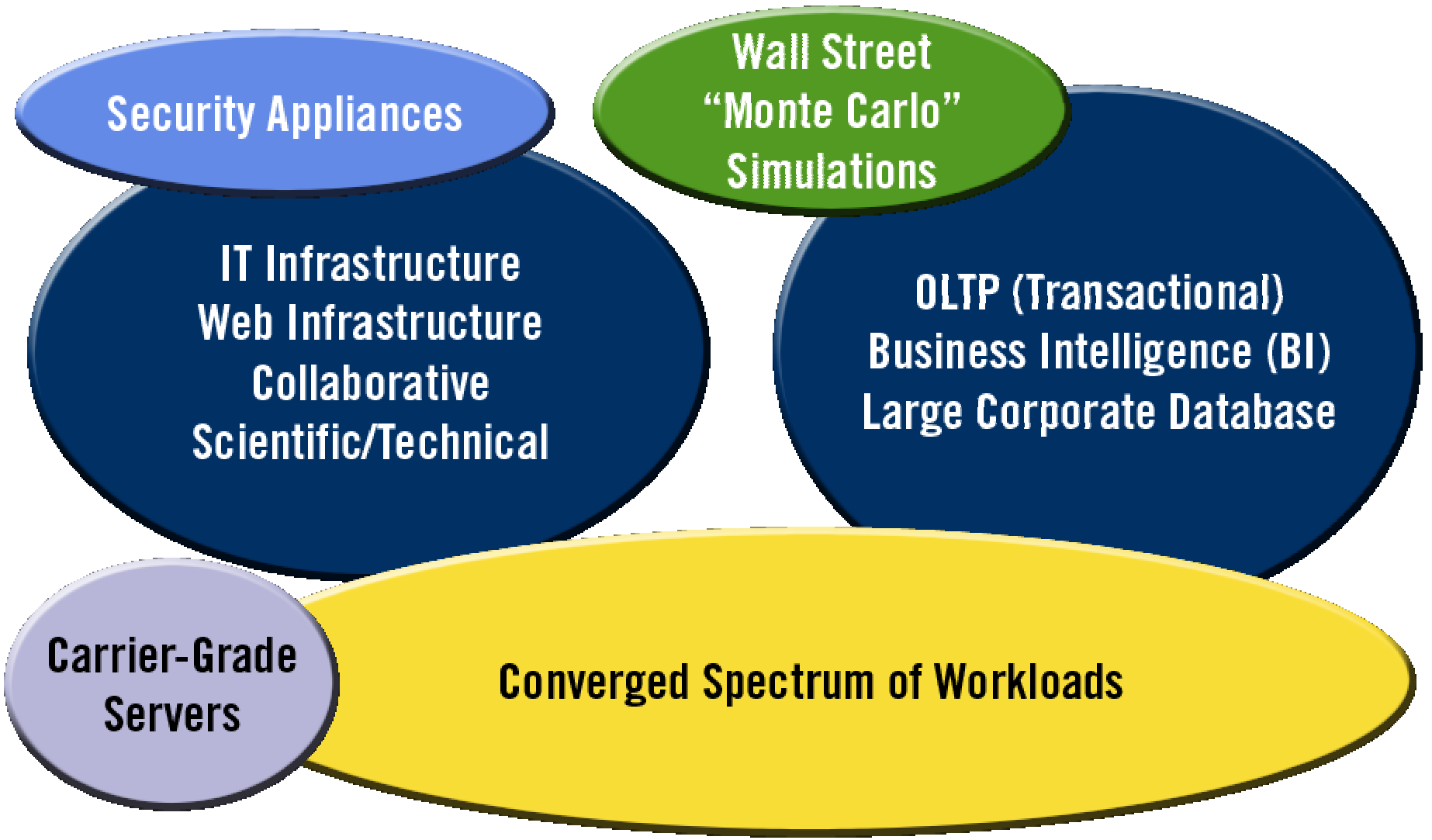

# Building a Linux Datacenter Ecosystem

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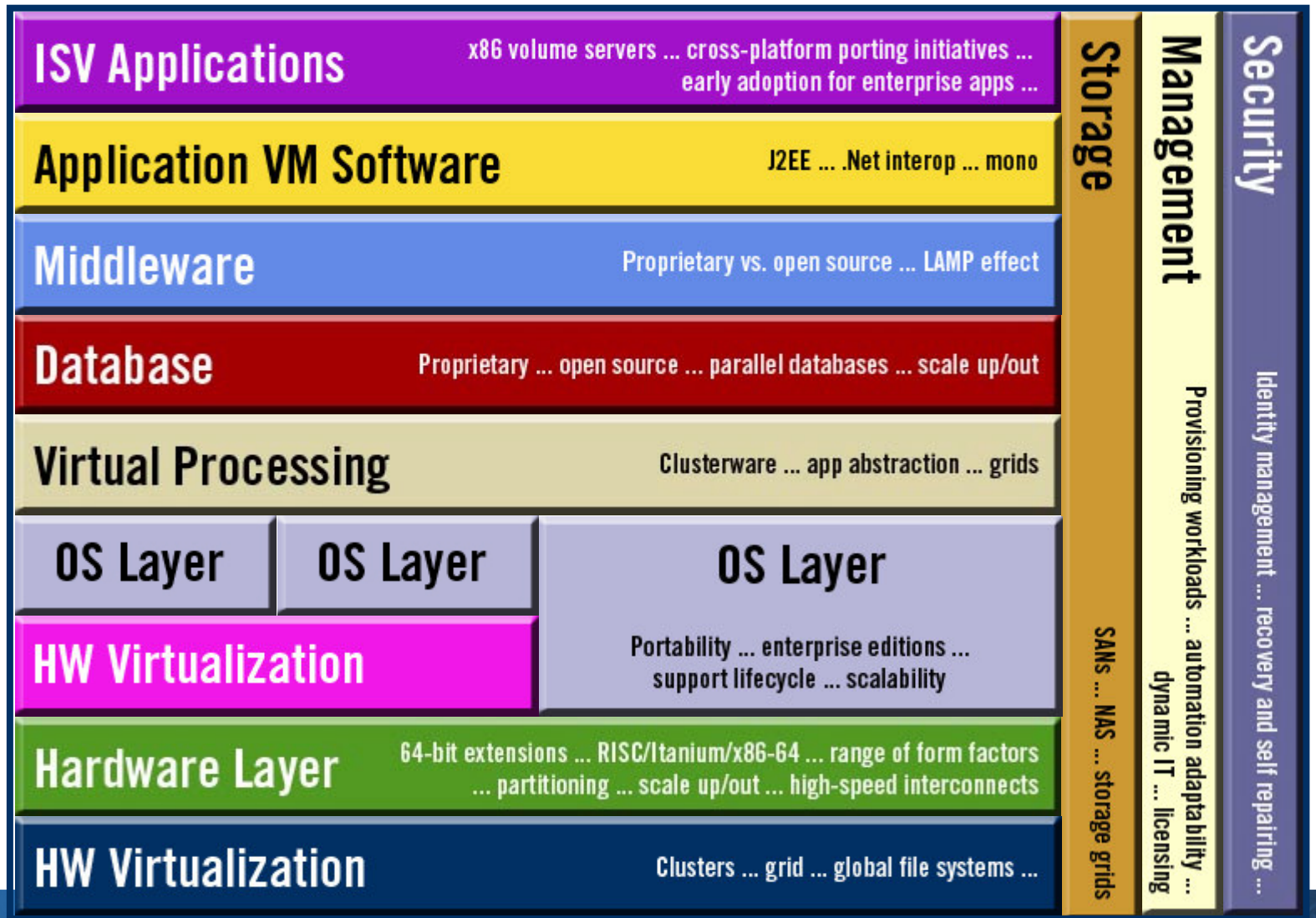

# Scale Up, Scale Out—or Both?

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- Scale-Out Drove the Early Adoption of Linux Servers . . .
  - High Performance Computing (HPC) Clusters
  - IT Infrastructure (File/Print, Network Support)
  - Web Infrastructure Server Farms
  - Clusters of Enterprise Linux Servers (e.g. Oracle RAC)
- Scale-Up Linux Servers Leveraging Linux 2.6
  - Midrange Enterprise and High-End Enterprise
  - Database Workloads and Data Warehouse/Data Mart
  - Decision Support and Data Analysis
  - Business Intelligence (BI)
  - Line-of-Business (L.O.B.) Applications
  - Scale-up Nodes for a Scale-Out Cluster

# A Spectrum of Linux Workloads Across the Enterprise, 2006

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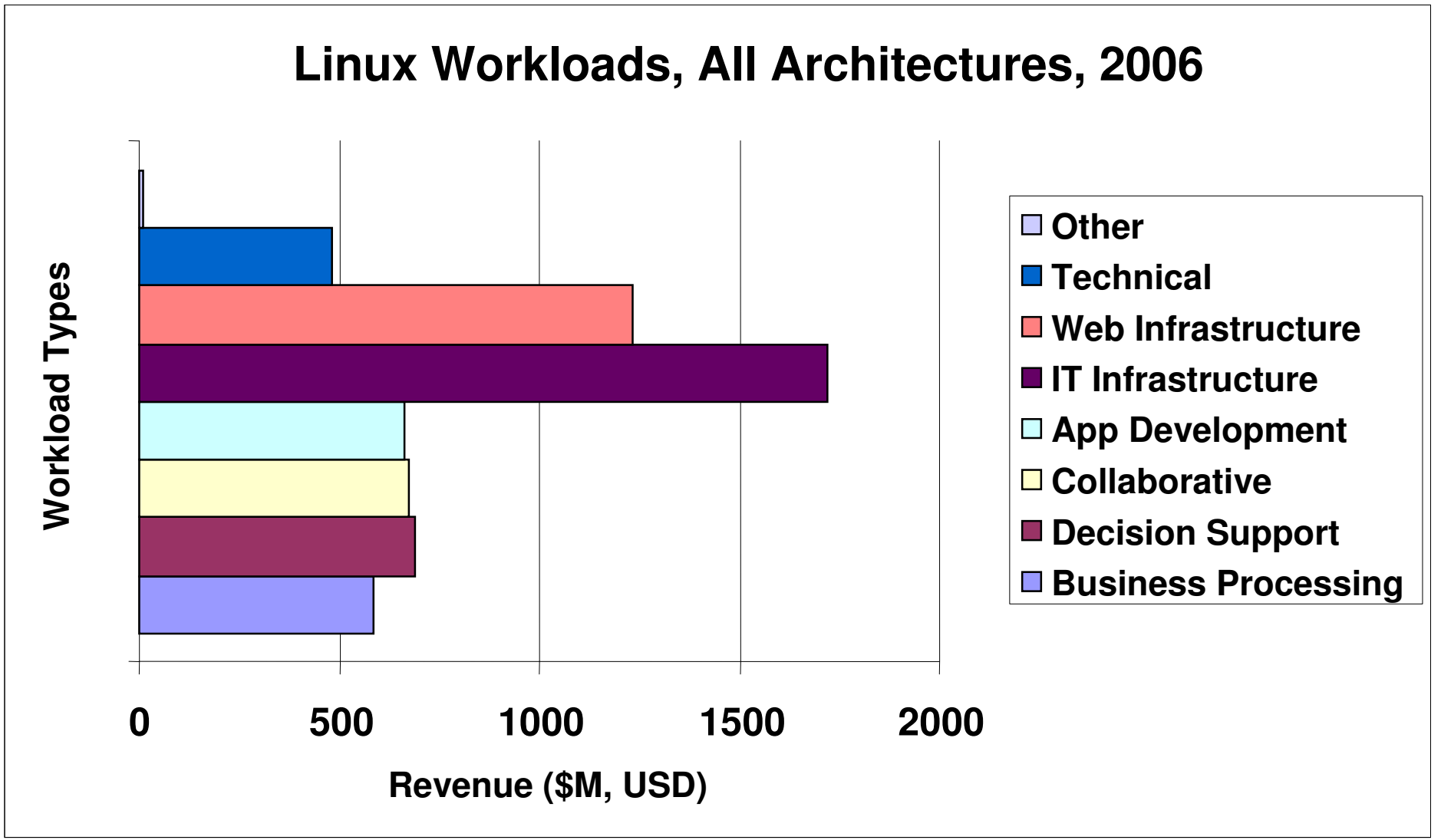

# Linux Workloads, x86-64 Workloads

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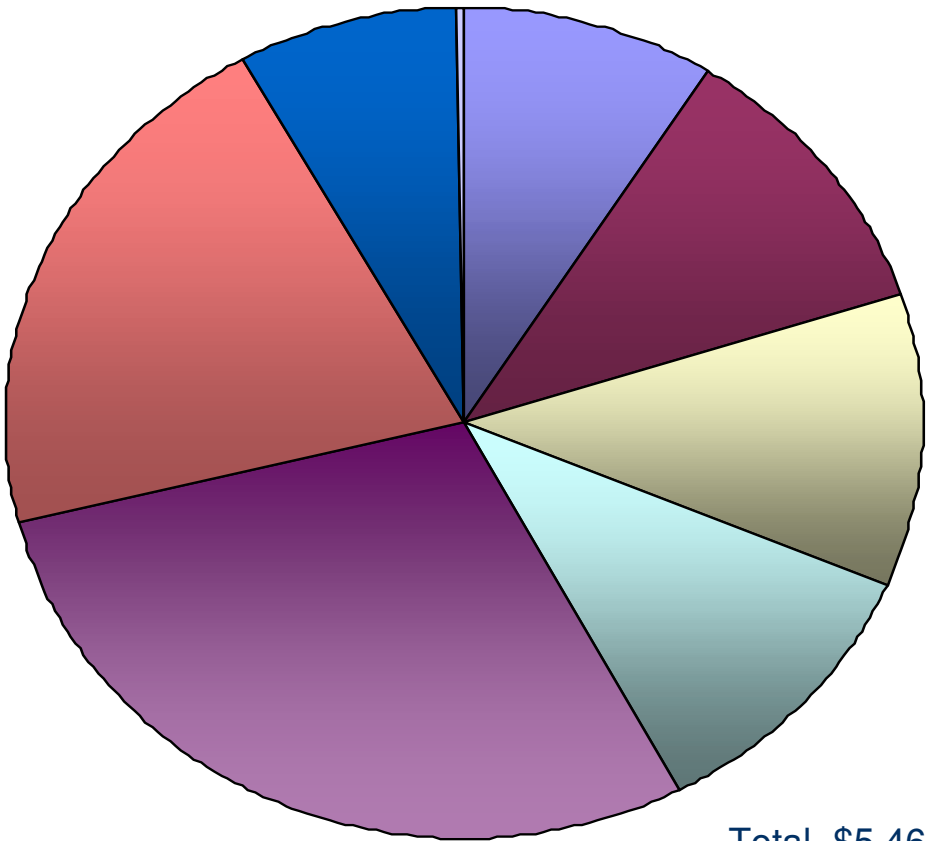
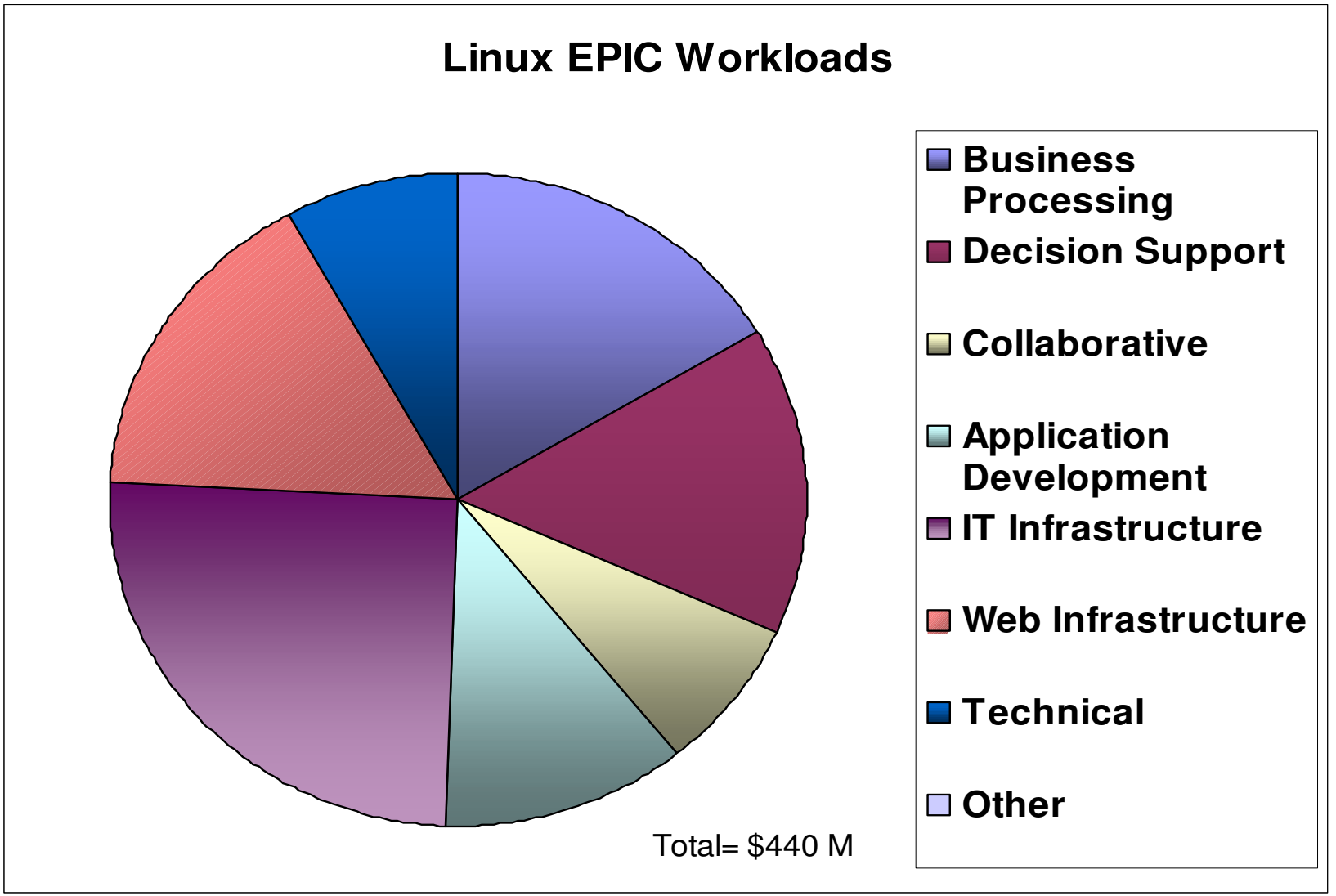
## Linux Workloads, x86 Servers



Total=$5.46 billion, 2006

- Business Processing
- Decision Support
- Collaborative
- Application Development
- IT Infrastructure
- Web Infrastructure
- Technical
- Other

# Linux Workloads, EPIC Servers



# Unix Workloads, RISC Servers

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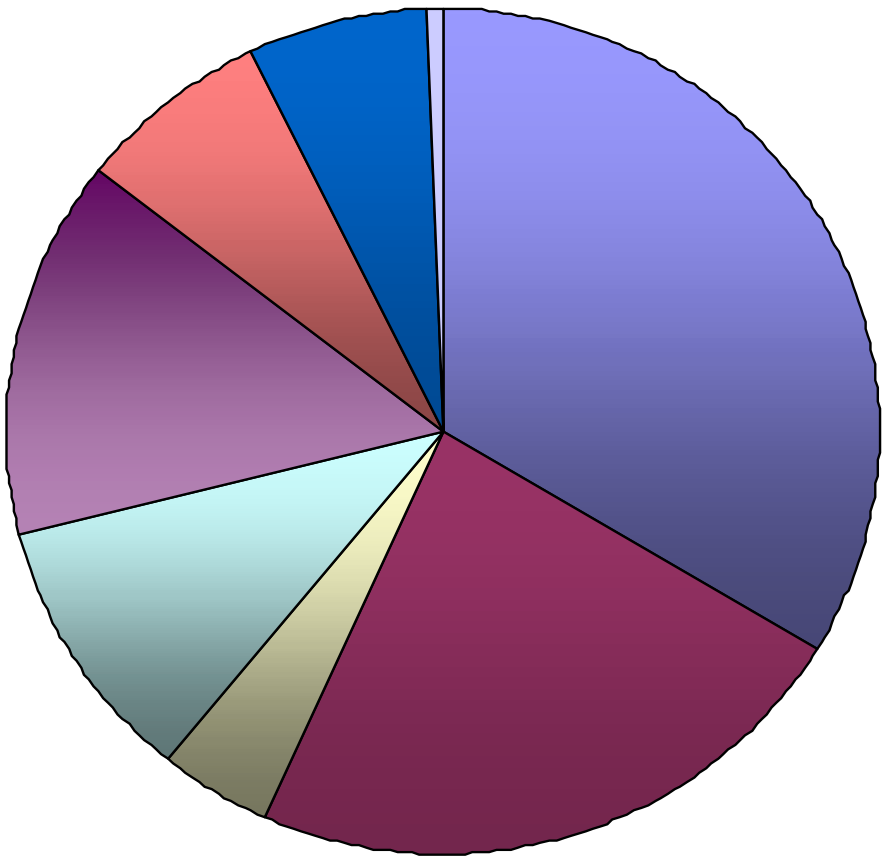
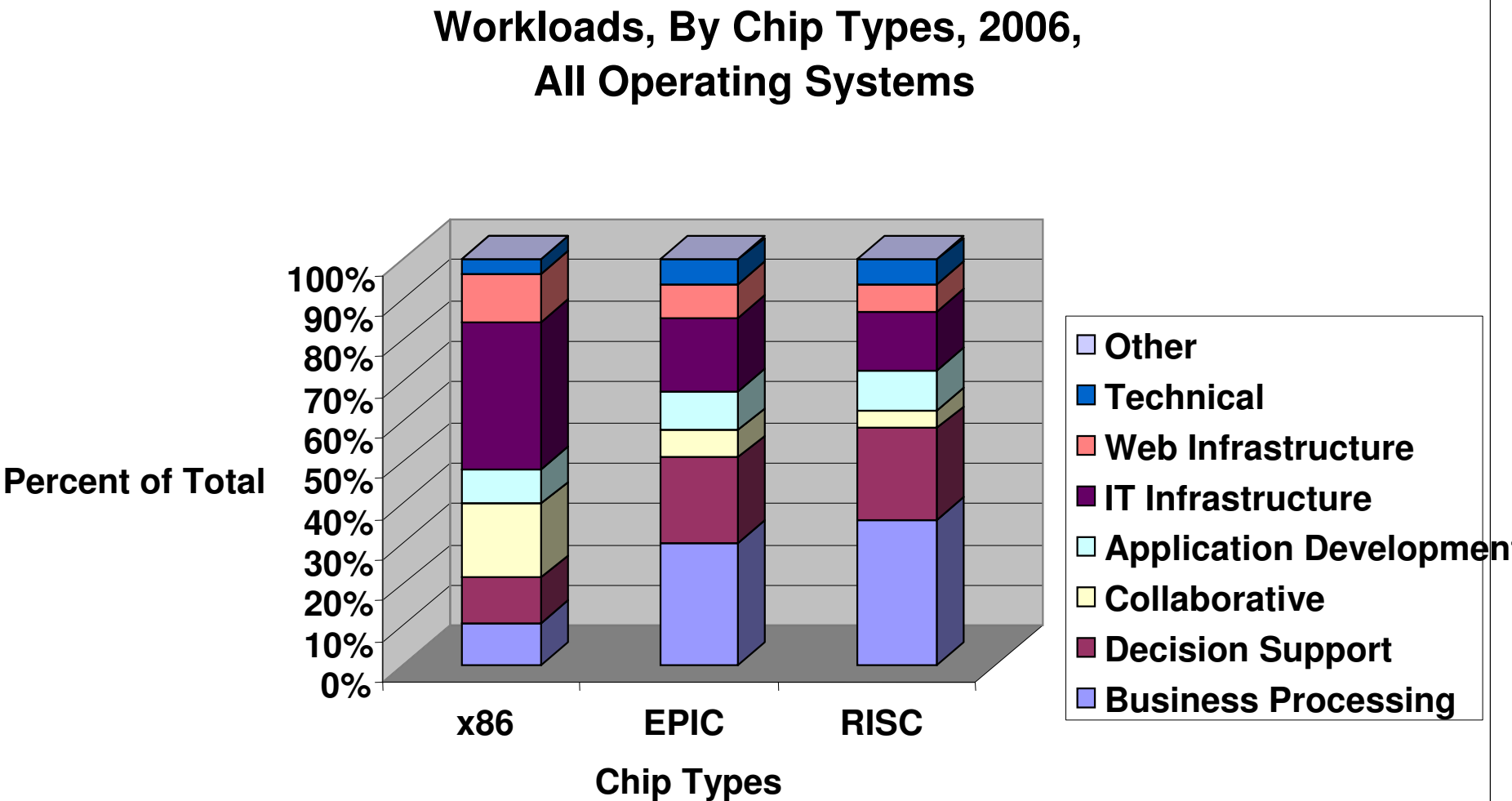
## Unix Workloads, RISC Servers



Total=$16.4 billion, 2006

- Business Processing
- Decision Support
- Collaborative
- Application Development
- IT Infrastructure
- Web Infrastructure
- Technical
- Other

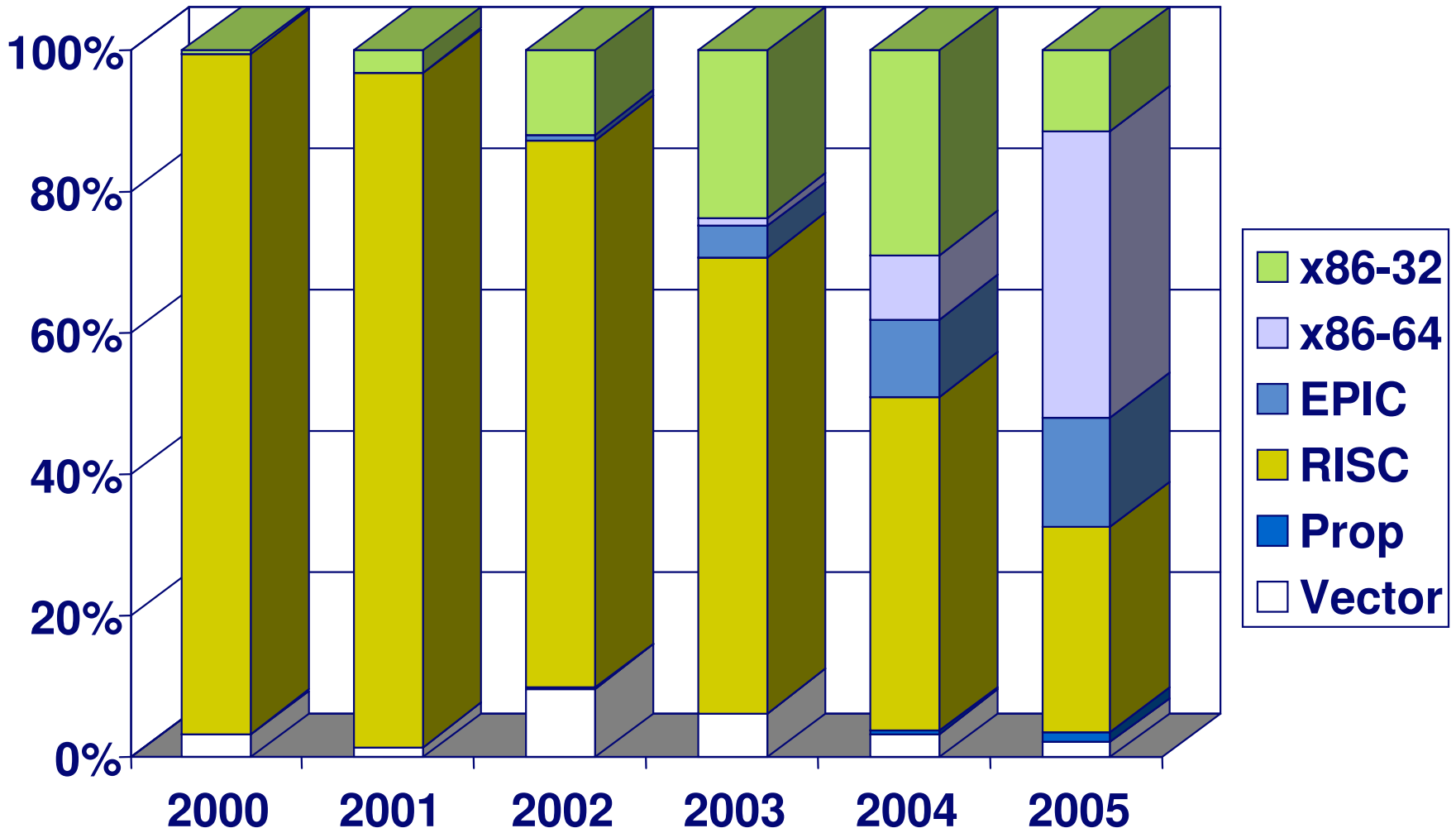
# Workloads, All Chip Types, All Operating Systems: 2006



# HPC Deployments

- Scale-Out Model: Clustering of Linux/Itanium nodes
- Scale-Up Model: Scalable Linux servers
- Parallelized Workloads Help Scale-Out Adoption
- Itanium's floating-point resources aids HPC adoption
- OEM systems with high-speed interconnects speed throughput for HPC cluster workloads
- Vertical markets: Oil/gas, aerospace, automotive
- Life and materials science
- Structural analysis in engineering/design

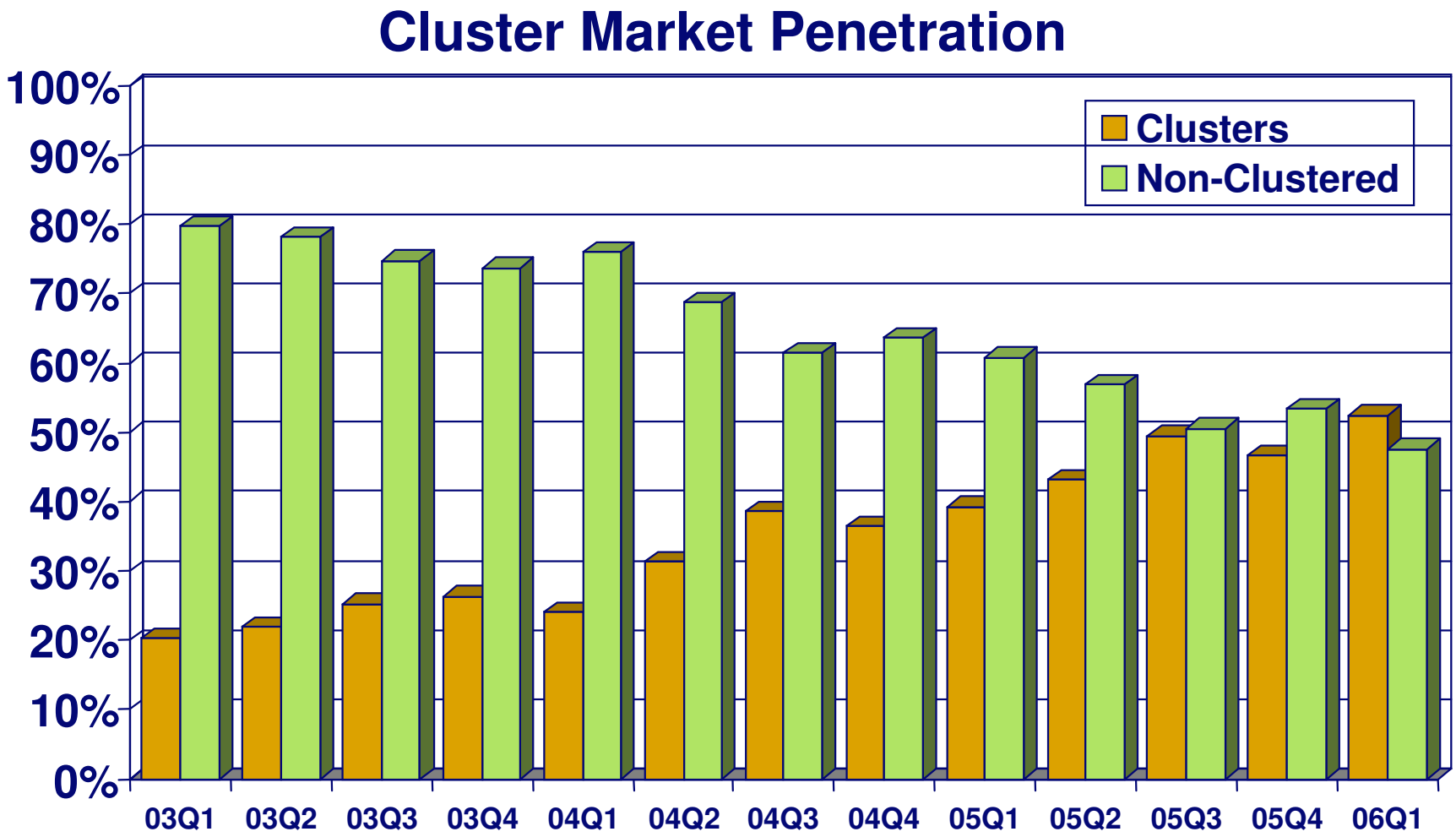
# HPC Revenue Share, By Processor Type, 2000-2005




Source: IDC, 2006

Prop = Proprietary, i.e. FPGA, BlueGene, cell

# HPC: Growth In Clusters



# Enterprise Workloads

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- **Business Processing**
  - **Online Transaction Processing (OLTP)**
  - **Line-of-Business (LOB) Apps, includes ERP and CRM**
  - **Business Intelligence (BI)**
- **Decision Support**
  - **Includes Database Workloads**
- **Itanium's large cache sizes aids database-centric adoption**
  - **OEM systems with large memory, fast I/O speed throughput**
- **Collaborative Workloads**
- **Application Development and Testing, Leverages Partitions**

# Database on Linux Itanium Servers

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- Support for Web workloads, persistent data-store
- Support for scalable, corporate databases
- Clusters support scale-out databases
- Data Warehouse and Data Marts
- Databases supported on Linux and Itanium include:
  - Oracle 10g
  - Sybase ASE
  - IBM DB2
  - MySQL

# Forecast and Outlook

- Increasing Adoption of Virtualization
- Ramp-up of Multi-core Processors
- Focus on Operational Costs (Opex)
- Customers Looking for Integration, Simplicity
- Reduction in Power/Cooling Requirements
- Continuing Consolidation of Workloads
- EPIC Itanium Moving into RISC Workloads
- Installed Base and IT Transformation

# Worldwide Server Market:
*Cost of Management Ramps Dramatically*

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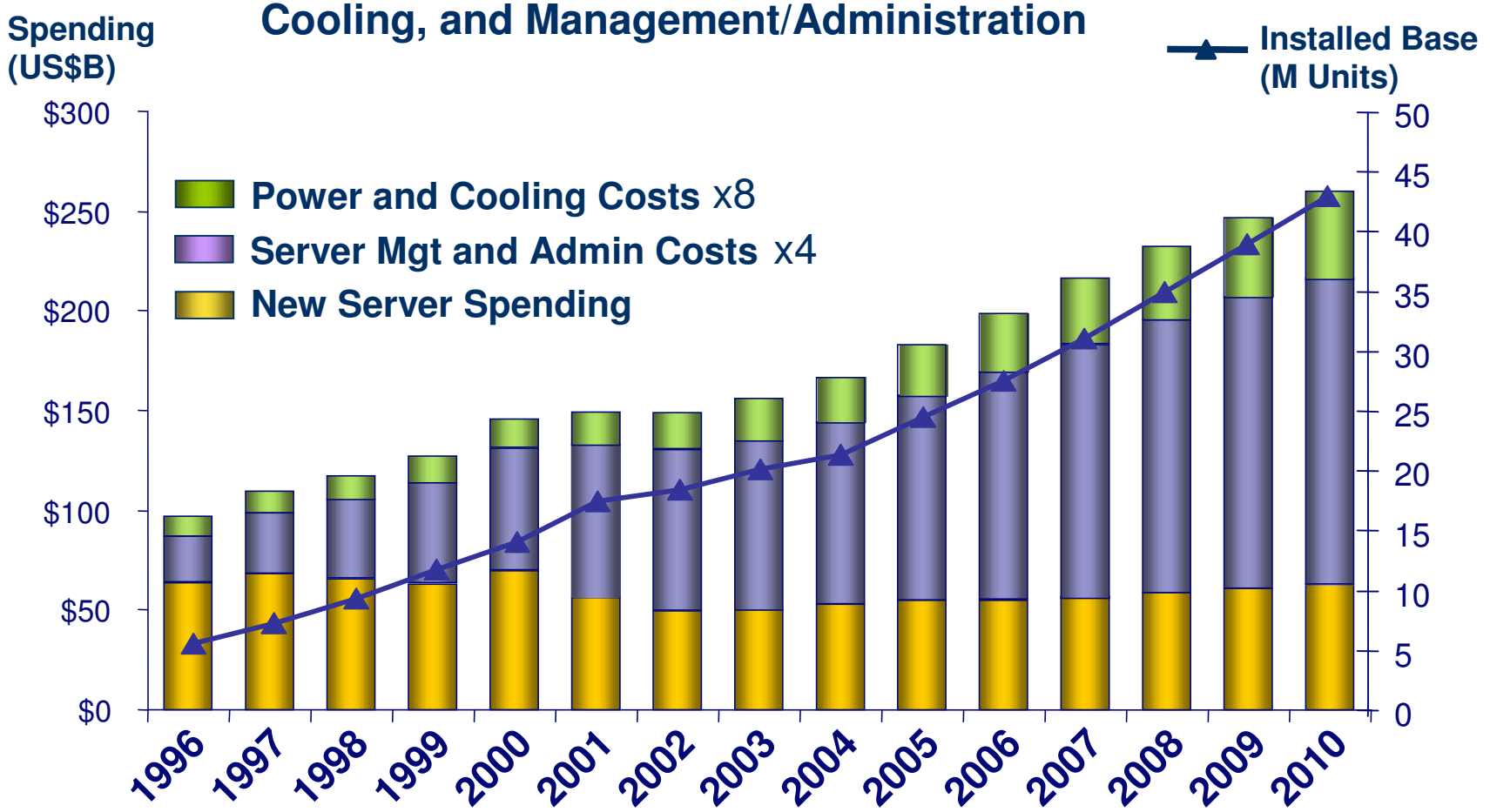
## Worldwide IT Spending on Servers, Power and Cooling, and Management/Administration




**IT Spends $0.50 in Power & Cooling For Every $1.00 in Hardware**

# Itanium-Based Servers, WW Factory Revenue, 2004-2006

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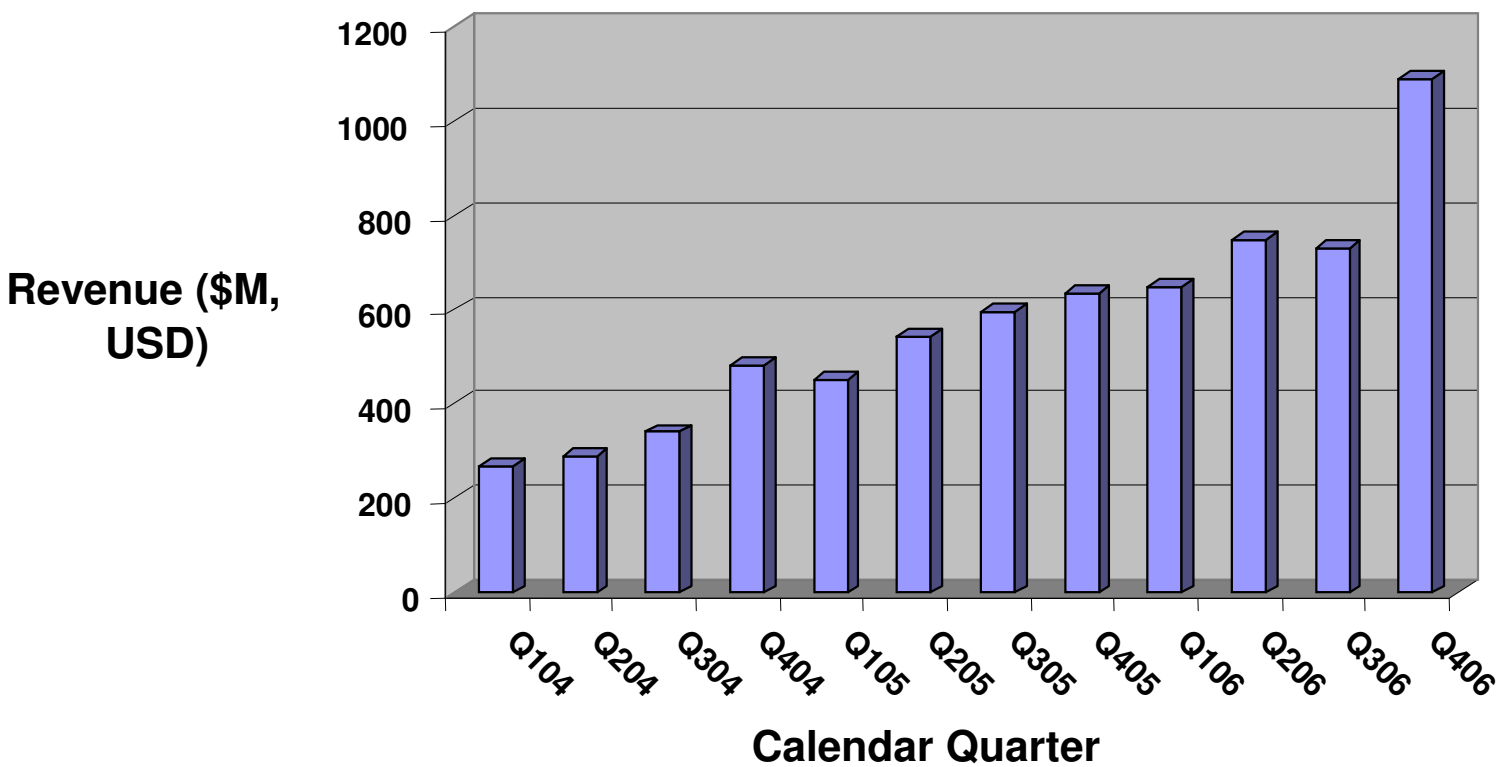
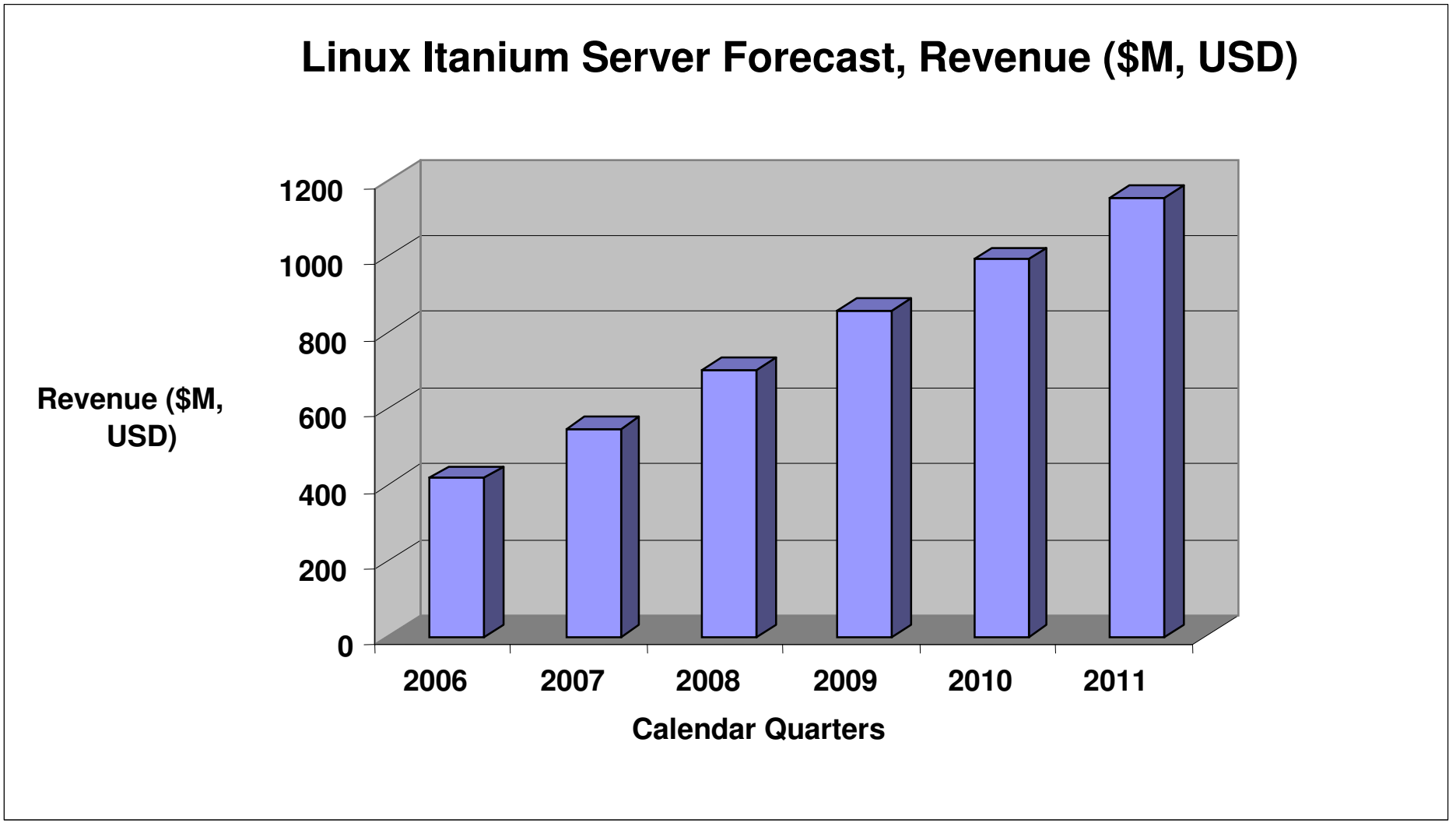
## WW Revenue, EPIC Servers, 2004-2006



# IDC Forecast: 2006-2001



# Essential Guidance

- Linux servers have gone mainstream in the technical and commercial computing spaces
- Linux runs across multiple server platforms—and is an important operating system for Itanium-based servers
- Workloads on Linux reflect a broad spectrum of computing
- Adoption is seen for:
  - HPC high-performance computing and technical computing
  - Database-centric workloads and business intelligence (BI)
  - Support for horizontal ISV apps (line-of-business, database)
  - Vertical apps (e.g. structural analysis, life sciences, oil/gas)
  - Custom apps, written by customers' companies
- Deployment types for Linux/Itanium servers vary, including clusters and SMPs, rack-optimized servers and bladed servers

# Questions?

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